Session de perfectionnement : Imagerie spectrale, apport pour le clinicien

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Résumé

Objective: To describe the principal medical applications of spectral imaging.
Medical applications of spectral imaging in computed tomography (CT) rely on the basic principle that this technique allows a more precise material differentiation[1]. It is helpful in metal artifacts reduction or bone removal. Another use is renal stone composition determination [2].

Monoenergetic images at low keV provide enhanced density and reduced noise; hence, CNR and SNR are higher, with the additional advantage to decrease further more contrast medium doses and radiation exposure; at high keV, blooming artifacts are reduced, improving stenosis assessment in highly calcified patients in coronary CT angiography for instance. Moreover, atherosclerotic plaques composition becomes achievable, with the hope to identify vulnerable plaques[3].

The other main advantage is establishment of iodine maps. This can be used to generate virtual noncontrast images from enhanced images, i.e. with a reduction in radiation exposure; determining iodine concentration within an organ improves both sensibility and specificity of enhancements detection, for instance to distinguish between a tumor and a thrombus, between hemorrhage and enhancement, to detect endoleaks, or to follow-up on antiangiogenic therapies[4-6]. It is also key for a more robust perfusion quantification, leading towards functional CT imaging, in lungs for pulmonary embolism diagnosis, brain for stroke, cardiac for ischemia detection, or "body" in oncologic applications [7-10].

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